PMA 3 SHELL HEATER ACTIVATION AND CHECKOUT

NOTE
This procedure requires 340 W of power.

1. CHECK PMA SHELL TEMPERATURES AND CONFIGURE HEATERS

PCS Node1:TCS

Node 1:TCS

sel PMA 3

PMA 3

If all PMA3 Htr Temperatures are below 15.5 °C

sel PMA3 Htr Availability

PMA3 Htr Availability

cmd Htr1B Availibility - Ena Operate
√Htr1B Availability - Ena Opr
cmd Htr3B Availibility - Ena Operate
√Htr3B Availability - Ena Opr
cmd Htr5B Availibility - Ena Operate
√Htr5B Availability - Ena Opr

cmd Htr2A Availibility - Ena Backup
cmd Htr4A Availibility - Ena Backup

sel PMA3 TCS Overview

Attention symbols will appear next to all above heaters and associated 'PMA 3 Heater [X] Failed' messages will be entered into advisory log.

Heaters 2A and 4A will cycle to "Enable to Operate" mode and turn on.

√Htr 2A Availability - Ena Opr
√Htr 4A Availability - Ena Opr

Verify PMA3 Htr1B icon energized.
Verify PMA3 Htr2A icon energized.
Verify PMA3 Htr3B icon energized.
Verify PMA3 Htr4A icon energized.
Verify PMA3 Htr5B icon energized.

Otherwise √**MCC-H**

2. DEACTIVATE HEATERS

On MCC-H GO:

cmd Htr1B Availibility - Inhibit
√Htr1B Availability - Inh
cmd Htr3B Availibility - Inhibit
√Htr3B Availability - Inh
cmd Htr5B Availibility - Inhibit
√Htr5B Availability - Inh

cmd Htr2A Availibility - Inhibit
√Htr2A Availability - Inh
cmd Htr4A Availibility - Inhibit
√Htr4A Availability - Inh

-- IDENTIFICATION SECTION --

Procedure Name: PMA 3 Shell Activation & Checkout
Applicability: 3A
Frequency: Highly Desired on 3A.
Objective : Check PMA3 Shell heater softare and hardware.
Description: This procedure enables htrs 1B, 3B and 5B to operate and enables htrs 2A and 4A to backup. This selection checks one heater in each physical zone and some software functionality.
Crew Required : none (one as MCC-H back-up)
Power: 340 W
Data: N1-2 MDM's.
Duration : 5 minutes
Location : MCC-H or PCS
Parts : None
Materials : None
Tools: None
Constraints: None
Reference Material: NCS SRS
Assumptions:
- Distributed heater control software running in NCS
- PMA 3 Heaters are Inhibited

Definitions:
- A heater which is Enabled to Operate is being controlled in closed loop fashion by an MDM. The MDM monitors shell temperature and opens/closes heater RPCs as required to maintain the temperature setpoints.
- A heater which is Enabled to Backup will monitor temperature data only, it will not cycle on and off. It will automatically cycle to Enable to Operate if the Failure Lower Limit of its associated temperature sensor is violated.
- A heater which is Inhibited is not under closed loop control. Temperature sensor data is available to the crew/ground but heater FDIR is not active.

-- FUNCTIONAL SECTION --
---

1. If the all PMA 3 zones are below their failure lower limit setpoints, the expected temperature situation, this procedure will check proper heater functionality. If not, MCC-H will either wait for the temperatures to fall below the FLL setpoints or devise an alternate procedure. 3B Heaters will be set to "Enable to Operate." This state activates closed loop control (CLC) and FDIR routines for the heaters. As heater is set to the "Enable to Operate" state, the CLC will check the temperature for each heater and compare it to the upper setpoint (upper setpoints are slightly different, but all close to 21 deg C (70 deg F). If the temperature is below the upper setpoint, the heater RPC will be commanded closed. The FDIR routines trigger based on temperature, so if the temperature is below the Failure Lower Limit setpoint, the

attention symbol will appear and the PMA 3 Heater[X]B message will annunciate. Two of the A heaters will be placed in the ‘Enable to Backup” state, the FDIR routine will immediately declare a failure (based on the same low temperature that drove the attention symbol and advisory for the B heaters) and cycle them to “Enable to Operate.” MCC-H will track the shell temperatures to ascertain heater functionality.

2. After MCC-H has has sufficient time to watch the shell temperatures rise (based on heater output), the PMA3 heaters will be deactivated.